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Research Note

Gastrointestinal Helminths of the Anole *Anolis oculatus* (Polychridae) from Dominica, Lesser Antilles

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ABSTRACT: The gastrointestinal tracts of 20 *Anolis oculatus* from Dominica, West Indies were examined for helminths. Eight helminth species were present: *Ascarops* sp., *Oswaldocruzia lenteixeirai, Parapharyngodon cubensis, Physaloptera* sp., *Spauligodon cubensis, Spinicauda spinicauda, Mesocoelium monas,* and *Centrorhynchus* sp. Juvenile acanthocephalans (*Centrorhynchus* sp.) had the greatest prevalence (50%). *Spinicauda spinicauda* had the highest mean intensity (33.5). All are new host records for *A. oculatus.*

KEY WORDS: Polychridae, *Anolis oculatus, Mesocoelium monas, Ascarops* sp., *Oswaldocruzia lenteixeirai, Parapharyngodon cubensis, Physaloptera* sp., *Spauligodon caymanensis, Spinicauda spinicauda, Centrorhynchus* sp., prevalence, intensity.

Anolis oculatus Cope, 1879 is restricted to the island of Dominica, Lesser Antilles, where it occurs from sea level to about 914 m and is sympatric with 2 frogs, *Eleutherodactylus martinicensis* and *Leptodactylus fallax*; 1 turtle, *Geochelone carbonaria*; 4 lizards, *Gymnophthalmus pleei, Sphaerodactylus fantasticus, Sphaerodactylus vincenti,* and *Ameiva fuscata*; and 4 snakes, *Typhlops dominicana, Alsophis antillensis, Boa constrictor,* and *Liophis juliae* (Schwartz and Henderson, 1991). There are, apparently, no published accounts of helminths from *A. oculatus.* The purpose of this note is to report the helminths of *A. oculatus* from Dominica as part of an ongoing study of the biogeography of helminths in the Caribbean herpetofauna.

Twenty *A. oculatus* from Dominica (15°30′N, 16°20′W) were borrowed from the Division of Herpetology, Florida Museum of Natural History, University of Florida: (Saint Andrew Parish: UF 43568, 43569; Saint George Parish: UF 15811, 15819, 15822, 15824; Saint Patrick Parish: UF 15827–15830, 15833, 15835, 15837, 15839, 15845, 15847, 15849, 15850, 15852, 15854). Saint George Parish and Saint Patrick Parish specimens were collected in 1963; Saint Andrew Parish specimens are from 1977. The sample had a mean snout–vent length (SVL) of 65.8 mm ± 11.5 (SD) (range 47–84 mm) and consisted of 12 males (mean SVL = 73.4 mm ± 7.7 [SD] and 8 females (mean SVL = 54.4 mm ± 3.9 [SD]). The mean SVLs of males and females are significantly different (Kruskal-Wallis statistic = 11.78, 1 df, $P < 0.001$).

The body cavity was opened by a longitudinal incision from throat to vent and the gastrointestinal tract was removed by cutting across the anterior esophagus and rectum. The esophagus, stomach, small intestine, and large intestine were examined separately under a dissecting microscope. Helminths were removed and placed in a drop of undiluted glycerol on a glass slide. A coverslip was added and each helminth was allowed to clear before it was identified under a compound microscope. Terminology usage is in accordance with Margolis et al. (1982).

Six species of nematodes (*Ascarops* sp. as encysted larvae; *Oswaldocruzia lenteixeirai* Vigueras, 1938; *Parapharyngodon cubensis* (Barus and Coy Otero, 1969) Barus, 1973; *Physaloptera* sp. as larvae; *Spauligodon caymanensis* Bursey and Goldberg, 1995; *Spinicauda spinicauda* (Olfers, 1819) Travassos, 1920), 1 trematode species (*Mesocoelium monas* (Rudolphi, 1819), and 1 species of Acanthocephala (*Centrorhynchus* sp. [juveniles]) were found in *Anolis oculatus* (Table 1). All represent new host records. Specimens were placed in vials of alcohol and deposited in the U.S. National Parasite Collection, USDA, Beltsville, Maryland 20705: *Mesocoelium monas* (84469), *Ascarops* sp. (84471), *Oswaldocruzia lenteixeirai* (84470), *Parapharyngodon cubensis* (84468), *Physaloptera* sp. (84474), *Spauligodon caymanensis* (84473), *Spinicauda spinicauda* (84475), *Centrorhynchus* sp. (juvenile) (84472).

Larvae of *Ascarops* sp. have apparently not been previously reported from Caribbean amphibians and reptiles; however, larvae of *Agamospirura* sp. (a genus established for holding unidentified spirurids from herptiles) have been

Table 1. Prevalence, mean intensity (range), and location of helminths from 20 *Anolis oculatus* from Dominica, Lesser Antilles.

Parasite	Prevalence (%)	Mean intensity (range)	Location*
Mesocoelium monas	30	8.7 (1–39)	b
Ascarops sp.	40	25.8 (1–115)	a, d
Oswaldocruzia lenteixeirai	20	2.8 (1–4)	b
Parapharyngodon cubensis	30	2.0 (1–5)	a, c
Physaloptera sp.	25	4.4 (1–9)	a, d
Spauligodon caymanensis	5	12.0	c
Spinicauda spinicauda	10	33.5 (2–65)	c
Centrorhynchus sp.	50	4.3 (1–17)	a, b, c, d

* a = stomach, b = small intestine, c = large intestine, d = body cavity.

reported from cysts on the stomachs of toads (*Peltaphryne empusa, P. gundlachi,* and *P. peltocephala*) and frogs (*Eleutherodactylus cuneatus, E. planirostris, E. sierramaestrae, E. varleyi,* and *E. zeus*) from Cuba (Barus, 1972; Coy Otero and Ventosa, 1984). Definitive hosts of *Ascarops* sp. and the closely related *Physocephalus* sp. are mammals of the orders Artiodactyla, Lagomorpha, and Rodentia; intermediate hosts include insects of the orders Coleoptera and Odonata, and paratenic hosts include amphibians, reptiles, birds, and mammals which have ingested beetles (Anderson, 1992).

Oswaldocruzia lenteixeirai has been reported from toads (*Peltaphryne empusa, P. gundlachi, P. longinasus, P. peltacephala,* and *P. taladai*), frogs (*Eleutherodactylus atkinsi, E. cuneatus, E. dimidiatus, E. greyi, E. klinikowskii, E. pinarensis, E. planirostris, E. sierramaestrae, E. zeus, E. zugi, Osteopilus septentrionalis,* and *Rana catesbeiana*), lizards (*Ameiva auberi, Anolis allisoni, A. allogus, A. baracoae, A. bartschi, A. bremeri, A. equestris, A. homolechis, A. loysianus, A. lucius, A. luteogularis, A. quadriocellifer, A. sagrei, Leiocephalus carinatus, L. cubensis, L. macropus, L. stictigaster, Chamaeleolis porcus,* and *Cyclura nubila*), and snakes (*Alsophis cantherigerus, Antillophis andreai,* and *Tropidophis pardalis*), from Cuba (Barus and Moravec, 1967; Barus, 1972, 1973; Barus and Coy Otero, 1968, 1978; Coy Otero and Barus, 1979; Coy Otero and Ventosa, 1984), *Eleutherodactylus portoricensis* from Puerto Rico (Schmidt and Whittaker, 1975), and *Anolis sagrei* from Bahamas (Goldberg et al., 1994).

Parapharyngodon cubensis has been reported from lizards (*Ameiva auberi, Anolis allisoni, A. allogus, A. bartschi, A. bremeri, A. homolechis, A. jubar, A. lucius, A. luteogularis, A. porcatus, A. quadriocellifer, A. sagrei, A. vermiculatus, Gonatodes albogularis, Hemidactylus mabouia, Leiocephalus carinatus, L. cubensis, L. macropus, Sphaerodactylus cinereus,* and *S. torrei*), an amphisbaenid (*Amphisbaena cubana*), and snakes (*Alsophis cantherigerus, Trophidophis melanurus,* and *T. semicinctus*) from Cuba Barus and Coy Otero, 1969; Barus, 1973; Coy Otero and Barus, 1973, 1979); lizards (*Anolis lineatopus, A. grahami, A. sagrei,* and *A. valencienni*) from Jamaica (Bundy, et al., 1987; Vogel and Bundy, 1987); lizards (*Anolis bimaculatus, A. ferreus, A. gingivinus, A. lividus, A. pogus, A. sabanus, A. schwartzi,* and *A. wattsi*) from the Lesser Antilles (Dobson et al., 1992); and lizards (*Anolis bimaculatus leachi, A. grahami*) from Bermuda (Goldberg et al., 1995).

Only larval physalopterans were found in this study, but *Physaloptera retusa* has been found in the lizard *Cnemidophorus murinus* from Curacao (Specian and Whittaker, 1980) and *Physaloptera squamatae* has been reported in the lizards *Ameiva ameiva, Anolis allogus, A. baracoae, A. bremeri, A. equestris, A. homolechis, A. lucius, A. sagrei, Leiocephalus carinatus, L. cubensis, L. macropus, L. raviceps,* and *L. stictigaster* from Cuba (Barus and Coy Otero, 1968; Coy Otero and Barus, 1979).

Spauligodon caymanensis was previously known only from *Anolis conspersus* from Grand Cayman Island, British West Indies (Bursey and Goldberg, 1995). Our finding it in *A. oculatus* from Dominica extends the range of this nematode approximately 1,450 km eastward to the Lesser Antilles. *Spinicauda spinicauda* has been reported from *Ameiva ameiva* from Trinidad (Everard, 1975). *Mesocoelium monas* (=*M. danforthi,* see Nasir and Diaz, 1971) has been reported from *Bufo marinus* from Jamaica (Met-

trick and Dunkley, 1968; Wong and Bundy, 1985) and *Bufo marinus, Ameiva exul, Anolis cristatellus, A. cuvieri, A. evermanni, A. gundlachi, A. krugi, A. poncensis, A. pulchellus, A. stratulus,* and *Diploglossus pleei* from Puerto Rico (Hoffman, 1935; Confresí-Sala and Rodriguez de Vega, 1963; Cofresí-Sala, 1964; Acholonu, 1976). An acanthocephalan, *Centrorhynchus* (*?spinosus*), has been reported from *Anolis garmani, A. grahami, A. lineatopus, A. sagrei,* and *A. valencienni* from Jamaica (Bundy et al., 1987, Vogel and Bundy, 1987) and from *Anolis bimaculatus, A. leachi, A. lividus, A. schwartzi,* and *A. wattsi* from the Lesser Antilles (Dobson et al., 1992), where it is thought to be a parasite of the pearly-eyed thrasher (*Margarops fuscatus*) and the sparrowhawk (*Falco sparverius*).

Thus, all the helminths found in *Anolis oculatus* are shared with other Caribbean amphibians and reptiles. Determination of the extent of these shared helminths must await helminthological investigations of as yet unstudied Caribbean herptiles.

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Research Note

Sarcocystis sp. (Apicomplexa) from the New Mexico Ridgenose Rattlesnake, *Crotalus willardi obscurus* (Serpentes: Viperidae) from Sonora, Mexico

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ABSTRACT: Two of 4 New Mexico ridgenose rattlesnakes, *Crotalus willardi obscurus* Harris, 1974, from Sonora, Mexico, were found to be passing oocysts and free sporocysts of a *Sarcocystis* sp. in their feces. Sporocysts measured 11.9 × 10.3 (11.0–13.6 × 9.6–11.2) μm ($N = 20$) and had a shape index (length/width) of 1.15 (1.07–1.23). Attempts to transmit the *Sarcocystis* sp. experimentally to *Mus musculus, Peromyscus leucopus,* or *Microtus ochrogaster* were unsuccessful. This represents the first report of a parasite from this host.

KEY WORDS: Apicomplexa, *Sarcocystis* sp., Reptilia, Serpentes, Viperidae, ridgenose rattlesnake, oocysts, sporocysts, survey.

The New Mexico ridgenose rattlesnake, *Crotalus willardi obscurus* Harris, 1974, is a medium-sized viperid that ranges from the Animas and Peloncillo Mountains of extreme southwestern New Mexico south into the Sierra Madre Occidental to Zacatecas, Mexico (Stebbins, 1985; Campbell, et al., 1989). It is chiefly a mountain-dwelling snake occurring in the pine-oak and pine-fir belts, but also inhabits foothill canyons of madrean habitat. Although Barker (1992) recently reported on various aspects of the biology of *C. willardi,* nothing, to our knowledge, has been published on parasites of this snake. Here, we provide the first report of a parasite from *C. willardi obscurus.*

As part of a long-term mark-recapture study, 4 *C. willardi obscurus* (1 male, 3 females; snout–vent length = 370–463 mm) were collected during March 1990 from an unnamed canyon north of Cañon El Diablo, Sierra San Luis, Sonora, Mexico (elev. 1,920 m). Feces were obtained and snakes were released unharmed at their original point of capture. Samples were placed in 2.5% (w/v) aqueous potassium dichromate and processed further for coccidia using previously described methods (Upton and McAllister, 1990). Measurements were made on 20 sporocysts using a calibrated ocular micrometer and are reported